KIT 31. 9V SIREN

A surprisingly powerful siren powered by just a 9V battery. The Kit may provide the final building block in an alarm circuit using a relay to activate it.

The kit is constructed on a single-sided printed circuit board (PCB). Protel Autotrax and Schmatic were used.

ASSEMBLY INSTRUCTIONS

The printed overlay shows where to place the components. Use some wire to connect the switch and the speaker to the pads on the PCB at the distance you want. Both speaker and switch can be connected either way around. Make sure to get the electrolytic capacitor, diodes and the IC the correct way around. The cathode on the diodes is marked with a black band. This black band must match the bar on the diode on the overlay. To save space some of the components stand up on their ends on the PCB.

CIRCUIT DESCRIPTION

Operational amplifiers are a big subject in electronics. To understand this circuit first read about opamps in a reference book then try to follow this condensed explanation of the circuit.

When the switch is pressed C3 charges up through R4 with a time constant of 0.47 seconds. When the switch is released C3 begins a slower discharge through R7 and R3 with a time constant of about 5 seconds. The opamp is set up as a voltage controlled oscillator. The control voltage in this Kit is the exponential rise and fall in the voltage of C3 as it charges and discharges.

When the output of the oscillator (pin 7) switches low there is a charge remaining in C1 which holds pin 5 below the switching point. Current through R7 is proportional to the control voltage on C3. This current discharges C1 causing the voltage on pin 5 to rise toeards the switching point at a rate proportional to the voltage on C3. When the switching point is reached pin 7 switches high and initially pulls pin 6 high via C1. This causes the opamp to temporarily turn on hard. But C3 quickly recharges through D2 causing the voltage on pin 5 to fall below the switching point and causing the opamp to switch off again.

The positive pulse output from the opampputs a fixed amount of charge into C2 slightly raising the potential of pin 6. This causes the potential on pin 6 to rise and assist the sharp switch off of the opamp. Also R5 & C2 delay the rise on pin 6 long enough to get a good output pulse.

The cycle then repeats. However, during the C3 discharge cycle the rate of charge of C1 is lower with each repetition of the oscillator (because the control voltage is lower) and the output frequency is correspondingly lower. During the C3 charge cycle the reverse applies.

The output pulses are buffered by a second opamp then the current is applied to a driver transistor. The output waveform has a low duty cycle but gives a surprisingly loud sound.

Download the data sheet for the LM358 from the National Semiconductor website at

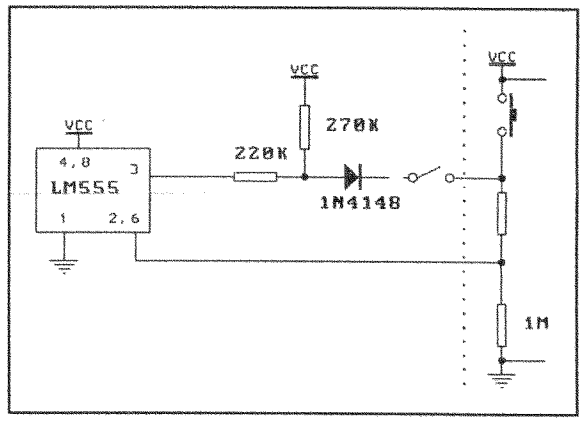
http://www.national.com

WHAT TO DO IF IT DOES NOT WORK

Poor soldering is always the most likely reason that a Kit circuit does not work. Check all solder joints carefully under a good light. Next check that all components are in their correct position on the PCB especially the diodes, electrolytic capacitors, and IC's. If by chance the siren does not completely turn off but keeps going 'click...click...click' the increase the value of R6 to 220R.

COMPONENTS

Resistors 5%, 1/4W:		
180R brown grey brown	R6	1
47K yellow violet orange	R4	1
100K brown black yellow	R2 R5	2
1M brown black green	R3	2
10M brown black blue	R1	1
Capacitors:		
1nF 102 ceramic	C2	1
10nF 103 ceramic	C1	1
10uF electrolytic	C3	1
BC639 transistor		1
LM358 IC		1
8 pin IC socket		1
8 ohm speaker		1
Push on/off switch		1
1N4148 diode		2
9V battery snap		1
K31 PCB		1



Add-on circuit to try. Components not supplied. Try to predict what will happen before you connect it. Just uses 220K & 270K resistor, LM555 and a 1N4148 diode.

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